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# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

VOL. XLVII
No. 1214

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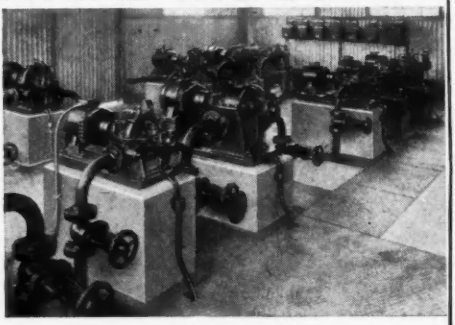

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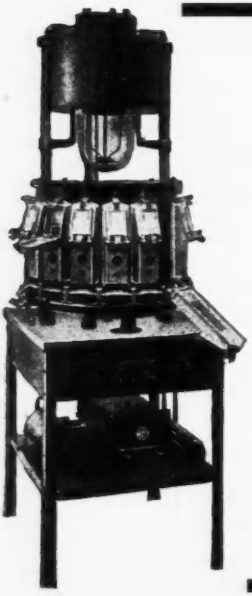

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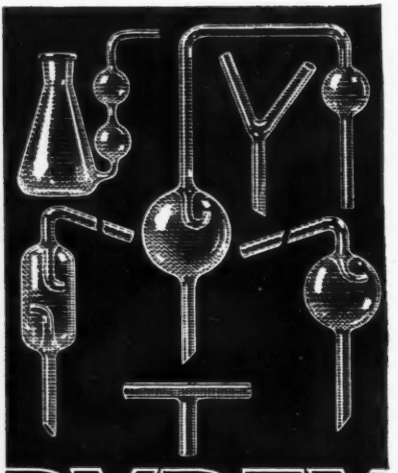

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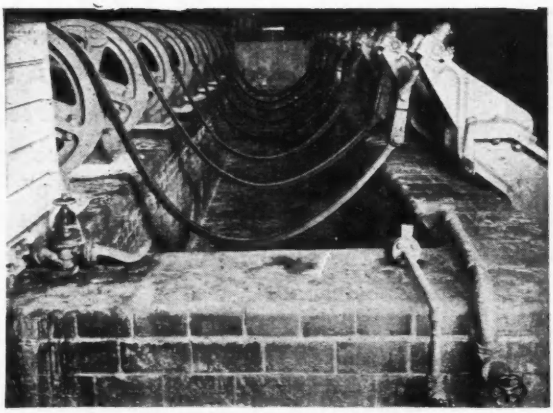

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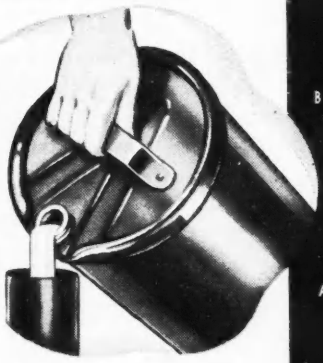

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# Output and Efficiency

THE problems of output and efficiency are among the most important in the war effort. They involve both management and labour. The first essential is, of course, that adequate raw materials shall be available, a requirement that involves the Civil Service with particular reference to the various controls which the Government has established. It is an advantage that the controllers and their staffs are for the most part drawn from industry and understand the difficulties of their former colleagues for whose benefit they are now in control.

When the raw materials and the machinery are available it is still necessary to operate them satisfactorily. Both quality of production and efficiency of production depend on the skill with which the factory is organised. It is, for example, an ascertained fact that the production of many furnaces or alternatively the fuel consumption in those furnaces could be greatly improved if more care were taken to fill them to capacity and thus to make better use of the fuel and plant available. In the chemical industry there is the same need for maximum output and in some directions an even greater need. There is also, owing to the nature of chemical processes, more difficulty in raising output than in many other industries which depend solely on machinery and on the avoidance of "wasters." Production can be greatly hampered by breakdowns and by apparently unavoidable occurrences which may result in the spoiling of a batch or may keep a portion of the plant out of production for a time. The cost of a process will also depend upon the quantities of materials used, and therefore upon the care with which they are used, and this applies to chemicals and to fuel, including steam and power, with particular force.

The avoidance of these difficulties is to-day greater than ever because the skilled technical staff who are usually responsible are overworked. There are so many calls upon their time, so many forms to be filled up, so many unusual problems to be considered, that it is difficult for them to apply the usual measure of control. The maintenance of production at a high level is thus dependent upon the workmen just as much as upon the technical staff. One of the major problems to-day is to enlist the interest of the workmen (a) in obtaining maximum production and (b) in avoiding waste of all kinds. The nation has been

## On Other Pages

*Notes and Comments* ... ... 293
*Indian Resins* ... ... ... 295
*Methylated Spirits Offences* ... 297
*Birmingham Chemistry* ... ... 297
*Alkali Electrotinning* ... ... 297
*Personal Notes* ... ... ... 298
*New Control Orders* ... ... 298

METALLURGICAL SECTION

*Handling Wrought Aluminium Alloys* ... ... ... ... 299
*Free-Cutting Steels* ... ... 301
*U.S. Iron Expansion* ... ... 301
*Light Metals in America* ... ... 302
*Canadian Tungsten* ... ... 303
*Parliamentary Topics* ... ... 304
*Iodine Process for Copper* ... 304

*General News from Week to Week* 305
*Commercial Intelligence* ... 307
*Stocks and Shares* ... ... 307
*Chemical Prices* ... ... ... 308

made peculiarly conscious of waste through the efforts of the Minister of Fuel and his staff, who are conducting one of the greatest publicity campaigns in history to encourage both industry and the private individual to save fuel. Fuel is not, however, the only thing to be saved, for there are many raw materials which are either in short supply or which have to be brought from abroad.

A great deal of this economy must depend upon the workmen. The staff can lay down principles and can see that machinery and plant are kept in proper repair and to some extent properly operated. There is, however, much that the staff cannot see, and much that could be accomplished if the goodwill and interest of the workmen were thoroughly aroused. How this should be done is a matter on which opinions differ profoundly. Some believe that it should be part of the workman's job to look after these things and that a good workman who is well paid will do so as part of his employment. That is a counsel of perfection. Others hold that positive encouragement should be given to the workmen. This view has found expression in bonus schemes, the basis of which is that whatever increased production is achieved or whatever economies are made should be shared in some proportion between the workmen and the firm. If for example, the cost of production in a given department can be fixed on a normal basis any reduced cost could be ascertained at stated intervals, and divided in the shape of a bonus between the firm and the whole of the employees in the department. That principle has already been put into effect with considerable success. Decreased cost can arise from (a) economy in raw materials, (b) from decreased maintenance through better care of the plant, and (c) from increased production with the same plant and labour. All of these depend on the joint efforts of the staff and the workmen, but it is the workman who has the greatest influence on costs. Bonus schemes can be operated on improved efficiency, as in many of the schemes that are in operation, or it can be based upon total costs excluding cost of raw materials, as in the more ambitious schemes. The Government has sanctioned the payment of a bonus on output in the coal industry.

A conception that lies midway between those which have just been described is an appeal to the competitive spirit in industry. This may be competition between individuals, between shifts, between departments, or between works. It may also take shape as an effort to beat a previous record. Competition between individuals and between shifts is not generally to be encouraged as it does not lead to the team spirit and may provoke actual unfriendliness. A useful form of competition was devised by an engineer with several works in his charge. He arranged that each week one of his engineers would visit each of the works and give marks for the condition of each item of the plant, the working results, etc. This was done with complete impartiality and the winning works over a whole month was allowed to fly a flag throughout the next month. This provoked a valuable spirit of emulation, with the result that the central engineering staff was in great demand to improve those sections of the plant which were found to get bad marks.

There is a good deal to be said for the inception of well-considered bonus schemes, though these involve careful planning in advance, coupled with care in operation to ensure strict impartiality. It may be that they require more complete analysis of the operating results, both material and financial, of processes and plants than have been made before. Schemes should not on this account be turned down as involving too much work. It is all to the good that firms should analyse their working results very closely and keep a continual check on production, on maintenance, and on the quantities of raw materials, heat, and power used.

In a sense bonus schemes are parallel with co-partnership schemes. But whereas co-partnership schemes depend on the financial results over the whole year, a bonus scheme appears to the workmen to be more completely their own concern. The operating results of a firm depend on obtaining orders, on the price secured for products, on the acumen with which raw materials are purchased, as well as upon the working results. A bonus scheme, however, depends on the working results only, as it would be operated on unit cost of production, exclusive of the cost per ton of the raw materials which lies outside the control of the workmen.

# NOTES AND COMMENTS

## Low Carbon Steel for Aeroplanes

WHILE the question of the possibility of building a cargo air fleet is being discussed in its broad terms wherever people meet to talk, the problem has been approached recently by Colonel R. B. Lord of the American Board of Economic Warfare in a more scientific manner. In the course of an article on the subject he writes of the materials which might be used. Aluminium, he says, is excluded, owing to shortage, while stainless steel uses up too many critical materials. He draws attention to the proposal of Vance Breese, an aircraft expert, that low-carbon steel is suitable. In its favour Colonel Lord states that it welds easily, that wing sections can be pressed into shape in the same way as motor car fenders, while internal construction will be much simpler. Because of the steel's greater strength, the aeroplanes will weigh very little more than those made of duralumin.

## Light Metals in Germany

THE hammering which the industrial districts of Western Germany have undergone at the hands of the R.A.F. has had two interesting effects, from the industrial point of view. These are the transference of a great part of the metallurgical industries to less vulnerable locations, and the call-up for war purposes of more and yet more "scrap." In Germany, to-day, "scrap" means any metal that the Government requires to be melted down, and a new development is the extension of the scrap campaign to include semi-manufactured products, castings, and unfinished articles of aluminium, magnesium, and their alloys. All goods made of these light metals are subject to immediate confiscation. Light-metal foundries and plants producing half-made light-metal articles must melt down their available material by the end of this month or dispose of it otherwise as scrap. At the same time, light-metal workers from France are in urgent demand, and although no exact details of the terms offered to them for compliance with German demands have come to hand, no doubt these will be tempting enough—until they have actually arrived in Germany.

## The Flight from the Rhine

MEANWHILE, many new factories are under construction, or on the point of opening, in Central and South-eastern Europe, a special development being observable in the hastening of aluminium manufacture in the hilly districts (with cheap hydro-electric power) of Czechoslovakia, Yugoslavia, and France. Aircraft factories are springing up in Austria, Bohemia, Moravia, Slovenia, and Hungary. The management is almost invariably in German hands, and even the majority of the workers are German, no doubt including many of those who have been driven from the Ruhr and the Rhineland by the intensified bombing raids. In order to speed up the work in these factories, direct Government control has been very considerably slackened; the urgency of the situation demands the untying of red tape. Employers' groups, for instance, have been given the right to decide the priority of allocation of the materials—raw or semi-manufactured—that they are allotted; and they themselves are left to deal with the rationalisation of the industries in which they are concerned. Even in France, the light-metal industries have been exempted from the latest cut in power supply.

## Heat and Light in October

CENTRAL heating, the standard of lighting, and electricity charges are affected by four new orders issued last week by the Minister of Fuel and Power. These are the Control of Fuel Order, General Directions Nos. 1, 2, and 3 (S.R. and O. 1942, Nos. 1928-30) and the Electricity Minimum Charges Order and General Direction, 1942 (S.R. and O. 1942, No. 1927). The first three came into force on October 1, and prohibit the turning on of central heating, with certain exceptions, for a month. The "controlled premises" to which the first two directions apply do not include premises used mainly or wholly for industrial purposes, nor hospitals, nor residential premises obtaining not more than 10 living-rooms. In view of the untrustworthiness of the British climate, provision is made for the relaxation of the prohibitions in respect of individual premises, and arrangements have been made for broad-

casting any such relaxation at short notice; it is stated, however, that "there is ample evidence from meteorological records to show that, apart from any brief cold snap or special local conditions, the prohibition will not involve any serious hardships." Lighting in shops and sale-rooms, etc., is affected by Direction No. 3, while the Electricity Minimum Charges Order revises the minimum quarterly charge for the consumption of electric power, in such a way as to cause no injustice to Public Utility Services, while meeting the just claims of consumers who have been economical with their electricity, as requested. A minimum charge of 25s. for a 12-month period is authorised, if energy to that value, charged for on the basis of the actual amount of energy supplied, is not consumed.

## Science in Agriculture

THE calling in of the scientists to take the place that they should rightfully occupy in the prosecution of the war has taken a long time, but there are signs that a movement in this direction is now speeding up. We have given accounts in recent issues of THE CHEMICAL AGE of the Government's increasing recognition of scientists. Results are already proving that the scientist very soon "pays for his keep." In agriculture, for instance, the testing of soil for deficiencies of substances which will ensure the best crops is being conducted in the laboratory, while among other problems that have been set these specialists are the length of time it will take to overcome such deficiencies and the sort of crops that can best be grown in the soil. The testing of milk to ascertain its keeping qualities is another type of chemical laboratory work which will attain greater importance in agriculture.

## Paper Restriction—in U.S.A.

THE recent Ministry of Supply Control of Paper Order, which further restricts the uses to which this precious material can be put, gives added interest to some notes we have seen recently on the paper situation in the United States. As we handle our almost-transparent morning newspaper we can offer little sympathy to the American reader who, in the interests of national economy, is now obliged to accept for his money a twenty-six-page paper instead of the twenty-eight-page issue of a year ago. The Sunday newspaper has long been expected, in America, to provide substantial material for the instruction and amusement of the whole family during the break from work and we wonder whether it is still able to fulfil this purpose with the 82 pages to which it has now been reduced in the interests of national economy. The average number of pages in 1941 was 88. It is estimated that the total consumption of newsprint in the United States during 1942 will be about 3,730,000 tons—a reduction of 200,000 tons compared with 1941.

## Ontario Research Continues

THE Ontario Research Foundation, the publication of whose interesting *Bulletin* was suspended not long ago owing to reasons not unconnected with the war, has been maintaining its beneficent activities in the cause of science. News of its recent progress has just reached us from across the Atlantic. The Director of Research reports that the Foundation has become increasingly concerned with problems associated with the war. In biochemistry it has been confirmed that vegetable-tanned leathers which have a high acidity in the finished state deteriorate more rapidly than similar leathers in which the acidity has been kept within certain limits. Work is proceeding on abrasion tests in relation to wear of leather. Production of organic acids from sugar has been continued.

## A Varied Programme

FOODSTUFFS, including bread, have been studied for vitamin content. Pathological, entomological, and soil studies of interest to farmers have been carried on in the agricultural laboratories, and co-operative work with industry has been done on silk problems. Mineral oil substitutes for more expensive vegetable oils have been tried in the processing of wool. In chemistry, the problems examined vary from the steaming of horizontal retorts in a gas plant, to investigation of defects in crockery. Facilities of the metallurgical laboratories have been used for gauge-testing, heat-treatment, physical testing and metallography. It is good news to learn that this admirable institution, though suffering from shortage of staff, is able to carry on its varied and beneficent activities.

# Indian Resins

## The Basis of a Plastics Industry

TYPICAL of the healthy desire to develop the natural resources of India to the utmost is the increasing interest that is being taken locally in the possibility of building up an Indian plastics industry, both natural and synthetic resins being taken into consideration. The current position and the possible future prospects of an Indian plastics industry were well summed up by Professor Sir S. S. Bhatnagar in his address to this year's meeting of the Indian Chemical Society, held in Baroda, which was reported in full in a recent issue of the Society's journal.

Of the natural resins of India, lac is by far the most famous, and the speaker devoted an important part of his address to the growth of the lac industry, paying due tribute to the energy of the Indian Lac Research Institute and the London Shellac Research Bureau. The activities of these institutions, however, have been fully recorded in our columns, and in the following résumé of Professor Bhatnagar's address attention is paid rather to the lesser known sources of resin in India.

### Using the Coffee Surplus

Before the war, as is well known, India was a large exporter of coffee, but export restrictions caused the coffee-growers of the sub-continent to seek for some other outlet for their surplus product. The melancholy paradox of South America, where coffee, over-produced, was dumped into the sea, had been resolved by the invention of the "cafelite" process, whereby coffee beans were converted into valuable plastic material, and now, in India also, chemists have been successful in developing a process for the production of a moulding powder from coffee beans, including even the lowest-grade material.

The green coffee beans are dried in an oven to facilitate their grinding. Dirt and stones are removed by flotation, but broken beans, black beans, sticks, or any cellulosic material do not necessarily have to be removed. The powdered coffee beans are made oil-free by refluxing with a suitable solvent. The oil-free powder is subjected to digestion at a fairly high steam pressure with a suitable chemicals and in presence of fairly large quantities of water for a certain definite interval of time. The resultant material is washed and ground to the requisite fineness. This powder, after mixing with a suitable plasticiser, is ready for moulding purposes. Articles prepared from the above powder are very strong, offer a good resistance to water, take a nice finish and can be drilled, sawed and machined. The flow of coffee-bean resins is not quite as good as that of the bakelite type of resin, but investigations show that it can be improved.

The by-products of coffee plastic manufacture are also of interest. Coffee-oil, for instance, can find many important uses. It is rich in vitamin D and hence should find use in cosmetics lotions, medicines, and fine quality soaps. It can be used as paint oil or cooking oil. And, of course, coffee is a well-known source of caffein valuable in the medicinal and pharmaceutical fields.

### Oil-Seed Plastics

Oil-seed cakes have also attracted attention, both owing to export difficulties and to their bad keeping qualities in a tropical climate. It was found that, after the extraction of the proteins and certain basic compounds, the remaining mass, when hydrolysed at a fairly high pressure and treated with certain naturally-occurring aldehydes, could be moulded under specific conditions of temperature and pressure. The mouldings compared fairly with phenol-formaldehyde products. Another, and much less well known source of resin is the Moon-plant, *Sarcostemma brevistigma*, known under various names in different districts of India. This trailing leafless jointed shrub is not uncommon in dry rocky places in the Deccan, and contains a large amount of milky sap, which has been used by the peasants both for preparing an insecticide and for making an intoxicating drink. By suitable treatment it has been possible to prepare a resin from this material, with a softening point of 60-65° C. The resin so obtained is soluble in benzene, but not in other common solvents. It is capable of yielding a good moulding powder with sawdust and wood powder. Although insoluble in water, it is not so resistant to water action as to compete with other synthetic resins with respect to this quality, but by suitable chemical treatment, it is possible to improve this property.

### Resins from Bagasse

Cellulosic matter and lignin, of which enormous amounts are annually thrown away as a waste product in sugar mills, have likewise drawn the attention of various workers as a source of cheap plastic material. A patent has recently been taken out by the Government in which, after a thorough and careful investigation of the working conditions, it has been shown that as much as 19 per cent. of resin can be obtained out of bagasse with little chemical treatment.

The bagasse from a sugar mill is washed well with water and dried in the open sun. When it is dry, it is powdered either in a grinder or preferably a defibricator to the

required mesh. The powdered bagasse is then subjected to steam hydrolysis under pressure in an autoclave. The ratio of water to bagasse, duration of hydrolysis, and temperature and pressure conditions have to be carefully regulated to effect maximum conversion into resinous matter. The resin thus formed within the the fibrous cells of bagasse is extracted by boiling the dry hydrolysed stuff with spirit or alcohol for the predetermined period. The resin, being soluble in spirit, is extracted from the fibrous tissue during the process of refluxing. An alcoholic resinous extract is thus obtained. It has an excess of the solvent, to get rid of which the alcohol is distilled off. The thick resinous mass is left behind in the retort. Even without alcoholic extraction it is possible to use the fibrous powder as such, as a moulding powder. Should it be necessary to obtain the resin in a powdered form, the last traces of the solvent can be removed over a water-bath. The resin is a dark brown, lustrous mass, brittle by nature. It has good binding and waterproofing properties. The melting point varies over a wide range, but a fairly average value is about 148° C. It can be plasticised in the usual manner. Recent investigations show that if the bagasse is hydrolysed in an alkaline or acidic medium, the yield is improved by 2 to 3 per cent. with no substantial change in the properties of the resin.

## Synthetic Resins

In order to establish a synthetic resin industry, a supply of the essential raw materials must first be assured. Certain of these are already available in India, but the supply does not appear to be adequate as yet in quantity. Perhaps the most important of the raw materials for plastics manufacture are phenol and formaldehyde. Phenols and cresylic acids are produced in reasonable quantities by the Bararee Coke Works and the Shalimar Tar Products. The plant for the manufacture of toluene, set up by Tatas, ought to result in the further increase of available phenolic by-products, but these industries must be developed still further to enable India to produce sufficient phenolic substances. Formaldehyde can be produced from methyl alcohol in the dry distillation of wood or it can be synthesised from alcohol. As both methyl and ethyl alcohols are available in India, there should be no difficulty in producing the necessary formaldehyde. As a result of the impetus given by the Board of Scientific and Industrial Research and by Dr. H. K. Sen, of the Lac Research Institute, two pilot plants are already manufacturing some formaldehyde. Among other aldehydes, good yields of furfural have been obtained from rice husk, but there are many other types of cheap cellulosic materials available in India, such as water-hyacinth, jute waste, etc., and from any one of these sources it is practicable to manufacture furfural cheaply. Plants for manufacturing formaldehyde and furfural could be developed without great expense and constructed locally.

## Calcium Carbide Manufacture

Melamine and vinyl resins need calcium carbide and acetylene respectively as starting materials. In the manufacture of calcium carbide pilot plant work has been completed, and Dr. J. C. Ghosh has expressed the opinion that it is quite feasible for him to make a ton a day of this material in Bangalore alone. Acetylene is important not only for resins, but for all metal and engineering industries, and it is hoped that the Government and the public will see to an early establishment of this industry in India. Cheap and abundant supplies of power are the main requisites of this industry. Nylon can be easily developed, as both adipic and sebacic acid can be readily manufactured locally, and laboratory work on the production of nylon is already in hand. The only materials which will have to be developed on the large scale are phenolic products. The cracking process in petroleum industries, now employed in both Assam and Rawalpindi, can provide starting materials for the development of styrene and synthetic rubber products and will no doubt engage the early attention of oil companies.

Carbon dioxide and ammonia form a set of raw materials for the manufacture of urea-formaldehyde resins such as Beetle and Plaskon. Carbon dioxide is readily and plentifully available in India. Ammonia is manufactured at present in limited quantities by Mysore Chemicals & Fertilisers and Tata Chemicals, and it is not unlikely that these firms will be able to meet the demands made by the plastics industry, if required. Ample supplies of glycerine are available in India and the principal firms manufacturing it as a by-product in the soap industry are Tata Oil Mills, Lever Bros. and Swaika Oil Mills, Lillooha.

## Development of Textile Waste

It is not for war purposes only that synthetic plastic materials are required in India. It is obvious that a country with such large supplies of vegetable and cracked oil gases, glycerine and cellulosic matter must be deeply interested in the plastic products. The great jute industry of Bengal and the growing textile industry with its cotton waste, and short-staple cotton as well as other fibre cultivators urgently feel the need of this industry, as without this their by-products and wastes cannot be suitably developed. The boards, the corrugated sheets and the containers, which can be made from moulding powders, contain at least 50 per cent. of this waste material and about 50 per cent. of one of the synthetic resins.

## Methylated Spirits Offences

### Fines Imposed

FINES totalling £410 and 51 guineas costs were imposed at North London Police Court last week by Mr. Claude Mullins, in connection with summonses by the Customs and Excise authorities for breaches of the peace-time requirements to obtain a permit before more than a certain quantity of methylated spirits could be stored, and by the Ministry of Supply for breaches of the war-time regulation that methylated spirits must not be moved or received unless a requisition form has been obtained from the Ministry, and the necessary permission has been given.

The Hackney Polish and Varnish Works, Ltd., were fined £75 and 11 guineas costs, and Albert Edward Hodgson, of Wallis Road, Hackney Wick, a director, was fined £195 and 29 guineas costs. British Mouldings and Mirrors, Ltd., were fined £40 and 2 guineas costs, and Alfred Defries, of Selsea Place, Crossway, Stoke Newington, a director, was fined £50 and 7 guineas costs. Lionel Edward de Courcy Gibbons, of 641 Lea Bridge Road, was fined £50 and 2 guineas costs

It was stated for the prosecution that Hodgson was a director of the Glasgow Methylatin Co., Ltd., who had a depot at Burwell Road, Leyton, and was also a main director of the Hackney Polish and Varnish Works. Gibbons was an employee at the Leyton depot and supplied methylated spirits to the defendant companies without permits or requisitions. The defendants pleaded guilty. It was explained that Hodgson had been suffering from ill-health and had left business matters a good deal in the hands of Gibbons.

## Birmingham Chemistry

### The Season's Programme

THE various organisations representing the chemical industry in Birmingham and district have completed their programmes for the forthcoming winter session. The first meeting of the Birmingham and Midland Section of the Society of Chemical Industry opened on Friday, September 25, at the Birmingham Chamber of Commerce, when Dr. Farmer, of the British Rubber Producers' Research Association, read a paper on "The Oxidation of Rubber." "Science in Brewing" was discussed by Dr. L. R. Bishop at a meeting of the Institute of Chemistry, also at the Chamber of Commerce, on September 23, and on October 16, Dr. R. J. L. Allen will discuss "Dried Foods with Special Reference to Vegetables." On October 23, before the Society of Chemical Industry, "Mucopolysaccharides" will be the subject of a lecture by Dr. M. Stacey, and on February 26 that Society will hold a joint meeting with the Food Group, with a discussion on "War-Time Food Packaging." Dr. J. M. Webster will speak on "Forensic Science" at a meeting of the Institute of Chemistry on November 18, and the annual meeting of that body will be held on March 24. On March 26 the Society of Chemical Industry will hold a joint meeting with the Plastics Group when Dr. K. W. Pepper will speak on "Paper Laminated Boards—Part II," and following the annual general meeting on April 16, Dr. A. C. Waine will speak on "Glasses: Synthetic and Safety."

The officers appointed for the ensuing season are as follows: Society of Chemical Industry: chairman, Mr. C. Diamond; hon. secretary, Mr. R. S. Potter; hon. recorder, Mr. J. E. Such. Midland Chemists Committee: chairman, Mr. Geo. King; hon. secretary, Mr. E. M. Joiner. British Association of Chemists: chairman, Mr. R. S. Potter; hon. secretary, Mr. J. K. Best. Institute of Chemistry: chairman, Mr. T. H. Gant; vice-chairman, Dr. S. R. Carter; hon. secretary, Mr. E. M. Joiner. Birmingham University Chemical Society: president, Prof. W. N. Haworth; hon. secretary, Mr. W. T. Cresswell. Chemical Society; local representative: Dr. S. Peat.

## ALKALI ELECTROTINNING

G. T. Bakhvalov has attempted to find out the most favourable conditions of working alkaline stannate baths (*J. Appl. Chem. Russ*, 1941, *14*, 469). The bath contains 16 g. of tin per litre and 12 g. (solution No. 1), 26 g. (solution No. 2) or 55 g. (solution No. 3) of NaOH per litre above the amount required to form $Na_2SnO_3$. At low anodic current densities the solution is partly reduced to stannite and the tin deposit is unsatisfactory. At high anodic current densities the deposit is good and the tin anode is passivated, but its degree of passivity gradually increases, if the current density is kept constant, the potential of the anode rises (*i.e.*, becomes nobler) and the yield of tin per unit current and especially per unit power decreases in time. The correct way of dealing with the stannate bath is to immerse the tin anode slowly under current; then, its passivity remains constant. The anodic current density (calculated for the fully immersed anode) producing steady passivity is 0.5-0.75 amp./sq. dm. for solution No. 1, 1-2 amp./sq. dm. for solution No. 2, and 1.5-3 amp./sq. dm. for solution No. 3, all at 70° C. and without stirring. With these current densities the anodic utilisation of current—for the reaction $Sn \rightarrow Sn^{\cdot\cdot}$ — is 85.91%. The best cathodic current density is 1 amp./sq. dm. for all the solutions examined; the cathodic yield is 80% for solution No. 1 and less for the other solutions.

# Personal Notes

DR. S. H. HARPER, who has been Organic Chemist in the Plant Insecticide Investigations section at Rothamsted since 1937, has been appointed Lecturer in Organic Chemistry at University College, Southampton.

MR. JOHN JAMIESON, the well-known scientific-instrument maker, of Cowcaddens, Glasgow, is a director of a new private company, registered in Scotland as scientific-instrument makers, laboratory furnishers, etc., under the name of John Jamieson (Glasgow), Ltd.

SIR ARCHIBALD CARTER is to be chairman of the Board of Customs and Excise, in succession to Sir Wilfrid Eady, it was announced on Tuesday. Sir Archibald relinquishes the chairmanship of the Eastern Group Supply Council. MR. OTTO MUNDY will be deputy-chairman in succession to the late Sir John Sutton.

DR. JOHN F. J. DIPPY, of Cardiff, has been appointed head of the chemistry department of Wigan and District Mining and Technical College, in succession to Dr. T. Heap, whose acceptance of the principalship of Batley Technical College was recently recorded in our columns. Dr. Dippy has for some time served as honorary secretary of the Cardiff Section of the Institute of Chemistry.

## Obituary

MR. ROBERT DURHAM, who died at Johnstone, Renfrewshire, on September 17, aged 77, had served for many years in the chemical department of Glasgow Corporation.

MR. ALBERT NASH, A.I.C., A.M.I.Chem.E., whose death at the age of 57 has been announced, was a founder-member of the Coke Oven Managers' Association. Starting his career as a steel works chemist, he devoted himself to by-product coking in 1914, and in 1924 operated a wood-distillation plant for Tyson & Bradley, Ltd. In 1927 he was appointed to his last post, as coke-oven manager with the Wath Main Colliery Co., Ltd., in his native town.

DR. GEORGE GERALD HENDERSON, D.Sc., F.R.S., Emeritus Professor (1919-37) of Chemistry at Glasgow University, died at Tarbert, Isle of Harris, on September 28, aged 80. Dr. Henderson was president of the Chemistry Section of the British Association in 1916, and had been president of the Chemical Society (1931), the Institute of Chemistry (1924-27), and the Society of Chemical Industry (1914-15). He was essentially an organic chemist, being especially interested in the terpenes and the chemistry of rubber, and was the author of many works on the subject, including the well-known "Catalysts in Industrial Chemistry."

MR. F. W. CLIFFORD, whose death on September 21 is announced, had been Librarian of the Chemical Society for 39 years. His ready assistance to all searchers in the chemical literature will be greatly missed. A successor has not yet been appointed.

MR. GEORGE CAMPBELL HEGGIE, for many years managing director of the Parozone Company, Ltd., chemical manufacturers, Parkhead, Glasgow, and connected with the firm for almost 50 years, died in Glasgow on September 24, aged 62.

MR. REECE HENRY VALLANCE, M.Sc., of Hampton-in-Arden, Warwickshire, who died on September 27, aged 54, was an F.I.C., and a member of the Chemical Society. In 1915 he went to France with a contingent of the Gas Corps, and since the last war he had been a lecturer in inorganic chemistry at Birmingham Central Technical College. He also contributed to textbooks on that subject, and was the author of numerous papers on scientific research.

# New Control Orders

## Export of Gums, Fats, Waxes, etc.

Under the Export of Goods (Control) (No. 39) Order 1942 (S. R. & O. 1942, No. 1907) which comes into force on October 12, control is extended to cover all waxes, natural gums, resins and lacs, and mixtures containing these materials. The Order also extends export control to certain additional chemicals.

I. Licences will, in future, be required to export, to all destinations, locust bean kernel gum and size; magnesium chloride and mixtures containing magnesium chloride; and papain.

II. Existing licensing requirements are superseded by the provisions that the licences will, in future, be required to export: (a) gums, resins and lacs, natural, and mixtures (other than medicinal preparations, paints and varnishes) containing such gums, resins or lacs; (b) lubricating or greasing compositions; (c) mineral jelly and mixtures containing mineral jelly, but not including medicinal preparations other than medicated toilet preparations; (d) oils, fats and greases, and mixtures consisting wholly or mainly thereof, but not including distempers, lacquers, varnishes, paints and painters' enamels or medicinal preparations other than medicated toilet preparations; and (e) waxes and mixures containing wax or waxes.

III. Control is extended to cover all mixtures (other than paints and medicinal preparations) containing casein and ingredients derived from casein.

IV. The control in respect of soap of all kinds does not extend to scourers containing less than 6 per cent. by weight of anhydrous soap.

# Metallurgical Section

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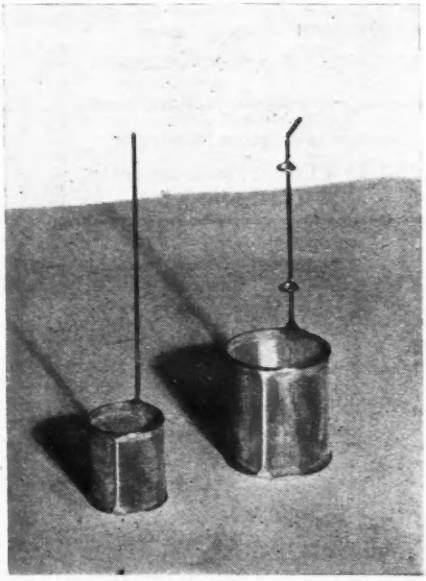

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# Metallurgical Section

October 3, 1942

## Handling Wrought Aluminium Alloys

### Protective Measures in Storing and in Transport

ALUMINIUM alloys have a higher resistance to corrosion than most other metals, but trouble is sometimes experienced when they are stored for long periods in unsuitable conditions. This and similar problems are dealt with in a booklet issued by the Wrought Light Alloys Department Association, of West Bromwich, Staffordshire, from which the following notes are taken. The most troublesome problem is usually corrosion of material held in stock or in course of processing in the workshop, but from this statement it must not be assumed that the corrosion-resistance of aluminium alloys is low. On the contrary, dry aluminium does not corrode, and, in the presence of moisture, the aluminium-rich alloys are far superior to the majority of other metals. Bright finished steel, for example, always requires greasing and adequate packing for transport.

#### Protective Oxide Film

The high corrosion resistance of aluminium-rich materials is conferred by a natural film of aluminium oxide which forms at once when cut metal is exposed to the air, and which slowly increases in thickness until, after some hours, no further oxidation takes place unless the film is broken or otherwise removed. Prolonged exposure to a moist atmosphere causes slight corrosion, resulting in a visible film which is white to grey in colour according to the alloying elements present. The presence of certain substances increases the rate of attack, this corrosion taking the form of numerous small excrescences, under which shallow pits are formed. Chlorides are particularly dangerous, and as they are used in various processes, they may be encountered in the works while, in service, chlorides are present in marine atmospheres and in the sea and some other natural waters. Corrosion in the presence of moisture is accelerated by contact with other metals, due to electrolytic action, and it is therefore essential to avoid such contact, especially between unprotected aluminium alloys and copper-rich materials or ferrous metals.

Commercial-purity aluminium has a minimum aluminium content of 99 per cent., and often is of higher purity than this, but the addition of certain alloying elements to improve mechanical properties reduces corrosion resistance. High corrosion resistance, combined with optimum mechanical properties, is obtained by the use of a strong alloy coated with pure aluminium. A smooth surface finish is important, and often a high degree of lustre is required on the finished article. As material is normally delivered with a high finish, care in storing and handling is necessary to avoid repolishing after fabrication. Further, as the dimensions of sheets, tubes, and sections may be closely specified, it may not be permissible to remove surface imperfections by machining or drastic polishing. It is particularly important to avoid any denting or scratching of light alloy tubes.

#### Dangerous Types of Moisture

Aluminium alloy products should be stored in situations where water is never deposited directly on them, but occasional accidental splashings seldom have any harmful effect other than leaving a slight stain. Water which has been chemically treated (*e.g.*, chlorinated) may be more harmful than well-water or rain-water. Moisture may also be deposited from the air, and this usually proves more troublesome than direct contact with water. As moisture must not be allowed to remain in contact for lengthy periods, rapid drying of damp material is necessary and, in addition to good general ventilation, it may be desirable to dry small articles (rivets, pressings, etc.) in hot sawdust or to use a current of air for sheets, etc. When a separate store for light alloys cannot be arranged, care must be taken to avoid contact with other non-ferrous metals or steels. Other materials must be so placed that small pieces of metal or their corrosion products cannot drop on to the aluminium alloys. Adequate ventilation involves a flow of air but incoming air must not be contaminated with fumes which might accelerate corrosion.

Sections and tubes are best stored vertically, for horizontal storage often involves removing a section by dragging, which is undesirable. Sheets are often stored horizontally, but vertical storage is preferable with spaces between sheets to allow unrestricted circulation of air. It is desirable to

arrange a separate place for each alloy, and every individual piece of metal should be stamped with its specification number. Shelving, racks and bins are preferably of wood and may be faced with soft aluminium sheet, although this is not usually necessary. As contact with other metals must be avoided, steel racks should be faced with wood in places where aluminium alloys are likely to make contact. Screw heads, nails, bolts, etc., projecting from wood work readily damage light alloys. Corrosion by moisture is accelerated by various alkaline compounds such as occur in cements, mortar, masonry, etc., while red and white lead, certain rubber products, size and liquid whitewash may also cause slight attack.

### Grease Film Protection

The aluminium alloys are protected against corrosion during storage and transport by coating them with a grease film and this practice is normally adopted by suppliers. A temporary protective must possess a combination of the following properties: it must be readily applied by dipping, brushing or spraying; the film must adhere firmly to the metal; it must give a coating of the desired thickness; the film must not become too thin when the material is stored vertically or when sheets are stacked horizontally; the coating should not harden or set, as it may crack from handling or owing to thermal expansion; the substance applied must not corrode or otherwise act on the metal; it must be easily removed as required. Some oils give good self-healing films, but the oil must not emulsify with water, neither should it harden in course of time.

Lanolin in a solvent is commonly employed, while a pigmented lanolin-resin solution is also used. Proprietary mixtures may conform with requirements but "anti-rust compounds" for ferrous materials are not always suitable for aluminium alloys, and a preliminary trial is advisable. A light cylinder oil is a satisfactory protective, but drying oils are not suitable as they are difficult to remove after exposure to the air. Sometimes an oil need not be removed before processing the material—for example, one which acts as lubricant in cold working. Between operations, protection may be afforded by process lubricants and it is particularly useful if the lubricant protects the metal both before and after operations such as pressing.

### Storing Welded Components

Successful storage of fusion welded components presupposes the removal of all corrosive flux residues. Most welding fluxes leave deliquescent chloride-rich residues and immediate washing of the assembly after welding is therefore essential. Boiling in water, combined with vigorous scrubbing, must be followed by thorough swilling and often by a 5 per cent. nitric acid dip followed by further washing. The articles must be thoroughly drained and dried quickly, otherwise any chloride in the final wash-water may set up corrosion. As the corrosion product is hygroscopic, the attack is progressive. Treatment in a chemical bath to improve corrosion resistance may be ineffective if any chlorides remain from welding. Although the aluminium alloys are immune from corrosion for a long time, when stored under reasonable conditions, periodical examinations should be carried out to ensure that moisture has not found its way into a stack of sheets, etc.

### General Precautions

Care in handling aluminium-clad metals is required as the protective high-purity coating is only about 10 per cent. of the total thickness. Dirt, grit, corrosion products, swarf, filings of other metals, etc., in contact with light alloys result in surface damage, especially during transit. They may be held in any grease film and may become embedded in the metal, thus reducing corrosion resistance and fatigue properties. It is thus necessary to remove all loose particles of such material from polished surfaces.

It is possible to confer partial protection against mechanical damage and corrosion, by painting the metal coat as soon as possible in the sequence of manufacturing operations. The priming coat may be used or a temporary paint coating may be applied, but any grease film is removed before painting. It is clearly impossible to carry out certain operations on painted metal and temporary coats may have to be removed before the specified finish is applied. Heat treatment, welding and anodic oxidation cannot be carried out on painted components.

## NEW ALUMINIUM ALLOYS

Four new aluminium alloys of high beryllium content, said to retain their tensile strength even when subjected to high temperatures, have been developed by the Aluminium Company of America. It is asserted that the new alloys are not weakened by temperatures of even 300° C. One of the new alloys comprises 20 to 40 per cent. beryllium and 1 to 8 per cent. magnesium. The second alloy has the addition of a small amount of copper. By adding zinc to a third, an alloy of greater strength is attained and the alloy is more readily age-hardened. Addition of silicon to the aluminium-beryllium-magnesium alloy makes it resist "fatigue," the weakness exhibited by metals after prolonged subjection to stress and strain.

# Free-Cutting Steels

## Introduction of Anhydrous Sulphite

DESCRIBING the results of recent researches, E. L. Ramsey and L. G. Graper, in a paper to the American Institute of Mining and Metallurgical Engineers, state that Bessemer sulphur steels roll better than similar grades made in the open hearth, and also that low-carbon steels that are open or semi-killed as tapped roll better than completely deoxidised or killed steels. This has led to the belief that oxygen plays an important part in the rolling qualities of sulphur-bearing steels.

It is generally held that the red shortness of sulphur steels is due to the low melting point of the sulphide compounds that separate out at the grain boundaries when the steel solidifies. At the rolling temperature of steel these sulphide compounds melt and cause cracking. These difficulties can be avoided, state the authors, if sulphur is introduced into the steel by means of an anhydrous sulphite, such as sodium sulphite or sodium bisulphite, which upon decomposition forms sulphur dioxide. It is assumed that, in this case, the oxygen of the sulphur dioxide forms part of the sulphide inclusions in the steel, and raises their solidification temperature enough, so that the formation in the steel of a low-melting eutectic is prevented. The result is the prevention of hot shortness and a more uniform distribution of inclusions.

Any large-scale treatment of steel with sulphite and bisulphite will require additional provision on the part of the chemical industry to supply the material needed.

### Slag Analysis

The addition of sodium sulphite to molten metal causes a vigorous reaction, liberating sulphur dioxide, which is taken up by the metal, and sodium oxide, which is a strong base and reacts readily with the oxides of the deoxidation reactions, forming a fluid slag that rises to the top of the steel. Some of the reactions may be as follows:—

$$Na_2O + SiO_2 \rightarrow Na_2SiO_3$$
$$Na_2O + Al_2O_3 \rightarrow 2NaAlO_2$$
$$Na_2O + 6SiO_2 + Al_2O_3 \rightarrow Na_2O.Al_2O_3.6SiO_2$$

The actual analysis of the resulting slag is as follows: $SiO_2$, 36.14 per cent.; $Al_2O_3$, 28.77; MnO, 5.55; FeO, 3.24; $Na_2O$, 21.15; S, 1.27. The percentages for $SiO_2$ and $Al_2O_3$ indicate that large amounts of refractory inclusions have been washed from the steel. These inclusions are abrasive, and their removal is shown by the increased tool life that is reported by the machine shops.

As the result of preliminary investigations it is believed that adding sulphur to steel by means of a sodium sulphite will produce: (1) A steel that can be rolled as well as if no sulphur were added. (2) A steel with fewer refractory inclusions because of the cleansing effect of sodium oxide. (3) A steel with more uniform distribution of sulphide inclusions. (4) A steel than can be machined with greater speed, more accuracy, better finish, and much longer tool life. It is also believed that these objectives can be accomplished with no effect on grain-size control, recovery of other alloying elements, or mechanical properties in the lower sulphur ranges.

### Increasing the War Output

These initial studies of the production of steels of improved rolling and machining properties are especially important at this time, when it is necessary to produce a first-class product, in the greatest quantities possible, that can be machined in a minimum of time, especially in the conservation of machine tools and in increasing the output of war material that must be machined in large tonnages. Further operational details are recorded in the *Iron and Coal Trades Review*, August 28, p. 700.

# U.S. Iron Expansion

### Old Mines Reopened

PLANS are under way for the revival of the once flourishing iron industry in Clarion County, Pennsylvania, where the United Sates Bureau of Mines is about to erect test plants for the production of sponge iron. Search for ores of high iron content has resulted in the discovery of several specimens which assay at between 39 per cent. and 58 per cent. of metallic iron. This compares favourably with other high-grade iron ores. Limestone ores tested showed from 31.5 per cent. to 38.75 per cent. of metallic iron. Between 1835 and 1875 there were 31 coal- and charcoal-fired furnaces in operation in this county, producing iron. Operations were curtailed in 1850 by the removal of a protective tariff on iron, and again still further, when timber supplies for charcoal-burning were exhausted. Some of the furnaces resumed operation during the Civil War, but ceased production because of competition from more modern methods. Ore beds in this district are from 10 inches to four feet thick and lie in close juxtaposition to the limestone beds. The ore makes excellent iron for all ordinary purposes and some of the higher grades are well adapted for Bessemer steel.

# Light Metals in America

## Enormous Expansion of Production

ALTHOUGH most of the producing countries have suspended the publication of metal statistics for the duration of the war, it is known that the world's aluminium production exceeded 1,000,000 tons in 1941. The increase may be seen from the fact that the world production in 1938, the last complete pre-war year, amounted to 578,800 tons, while in 1929 only 282,100 tons of this light metal were produced. The rise in production of magnesium was similar; last year's world production can be estimated at between 55,000 and 60,000 tons, compared with hardly 25,000 tons in 1938 and less than 10,000 tons in 1929.

While the strong rise in production during the last ten years before the war in the two metals was mainly due to the rapid completion of the German works, since 1939 the United States has contributed the greatest part to the increased production. Consequently the United Nations in 1941 had for the first time reached level terms with the Axis in aluminium supply and at the end of that year they could already record a small advantage in production. Aluminium and magnesium being the backbone of aircraft production and of other important war industries, the progress of the war depends to quite a considerable extent on the future supply of these two light metals.

### Revision of Plans

In this connection the new production plans for the output of aluminium and magnesium which the Government of the United States has initiated are of great importance. An expansion of aluminium production up to 725,000 tons and of magnesium production to 200,000 tons yearly is planned; and both projects should be realised by the end of this year. In the meantime the entrance of the United States into the war has caused a revision of these plans by the War Production Board and they now aspire to a yearly output of 1¼ million short tons of aluminium and 362,500 tons of magnesium. This extension, although at first sight fantastic, will very probably be attained. The aluminium production programme consists of four parts. The present yearly capacity of the American aluminium industry (which since 1939 has already been trebled) amounts, according to Government statements, to 850 million lb. Extensions already started last year cover contracts for 640 million lb., which the American Government has entered into with the Aluminium Company of Canada. In connection with these the American Reconstruction Finance Corporation has granted large financial credits to the Canadian concern for the delivery of 450 million lb. of Canadian aluminium to the United States in 1943. The remainder falls to the programme which was instituted after the States entered the war. Building contracts for the production of these enormous quantities are already on order, and preliminary work has begun.

### Magnesium Figures

The capacity of the American works for magnesium output has already reached the figure of 54 million lb. Last summer's expansion programme, however, already envisages plants with a capacity of 346 million lb., which are in an advanced stage of construction. Furthermore, the Defence Plant Corporation (an American Government Institution with the task of the introduction and supervision of armament works), has entered into contracts with six firms, which provide for the erection of magnesium plants with a total capacity of 157 million lb. per annum. The establishment of these works will be based upon the "Ferrosilicon Process," worked out by the National American Academy of Science. Further negotiations are pending for the erection of a plant employing the same method with a yearly capacity of 24 million lb. An addition of 144 million lb. per annum is projected, using an electrolytical process on the recently discovered magnesium-containing deposits in Michigan. The plan for the extension of American magnesium production should also be completed at the end of 1943. The development of the raw material sources required has been studied and so far the intermediate steps for both light metals have gone according to plan.

One of the main sources of supply lies in the production of aluminium from low-grade domestic bauxite and from clay, heretofore little used for aluminium metal, which has been recommended to the War Production Board by the Advisory Committee on Metals and Minerals of the U.S. National Academy of Sciences. Use of a proposed new process by the alumina plants will make it possible to include a substantial quantity of clay with the bauxite feed, so that less bauxite will be needed and the limited domestic reserve conserved. The committee reported on the results of a year's study of possible new sources of aluminium from clay, tailings, high-silica bauxite, alunite, kaolin, and the like, made at the request of the War Production Board. The current method, the Bayer process, is to treat low-silica bauxite with

alkaline solutions which remove the greater part of the alumina. The tailings, containing iron, titanium, and silicon compounds, are known as "red mud." The committee has found that treatment of this red mud by a recently developed sintering process will result in the recovery of substantial amounts of aluminium.

Of the several proposals to produce aluminium directly from clay without the Bayer process, the committee looked with favour on a sintering process known as the modified Petersen process, and recommends the construction of a test plant for the purpose. Continuation and expansion of various current pilot-plant operations, such as those operated by the Bureau of Mines and by Kalunite, Inc., in Utah, are urged. Finally, the committee says, "because the best raw material for the production of aluminium is bauxite, it is suggested that the prospecting programme for the discovery of new domestic deposits be prosecuted vigorously, and that the known domestic deposits be appraised as to grade, tonnage, and mineability."

# Canadian Tungsten

## Prospecting for Scheelite

THE loss of Empire supplies of tungsten from Burma and Malaya has greatly enhanced the importance of numerous scheelite deposits which have recently been discovered or re-investigated in Canada, and a summary of the progress made in the search is included in *Bull. Imp. Inst.*, 1942, *40*, 1, p. 62. Considerable losses of tungsten frequently occur in the milling and concentration of scheelite, in part owing to the relative softness of the mineral when associated with quartz and sulphides, but improved recovery has recently been achieved in new flotation plants operating in the United States, and chemical methods of recovery and beneficiation have also been introduced with success.

Canadian scheelite frequently occurs in gold-bearing veins, though seldom in quantities sufficient to be recovered at a profit, and its production from Canadian gold mines represents a direct contribution to the war effort on the part of the companies concerned. Using a portable ultra-violet lamp, an officer of the Department of Mines and Resources has recently inspected approximately 40 gold-producing properties in the Porcupine, Kirkland Lake, and other areas in Ontario, and in the Amos and Val d'Or areas of Western Quebec. To encourage the production of tungsten, high-grade scheelite concentrates from hand-picked ores are now being prepared in the ore-dressing laboratories of the Department. Although the ores are obtained mostly from gold mines in Ontario and Quebec, some fairly large shipments have come from mines in British Columbia, and a few smaller ones from the Mayo area, Yukon. Tungsten-bearing veins discovered during the past two years in the Yellowknife-Beaulieu River area, North-West Territories, have been examined by geologists of the Department of Mines. So far only about 5 per cent. of the favourable ground in this area has been carefully prospected for scheelite.

None of the two hundred or more scheelite veins examined is sufficiently large or rich to be mined profitably for tungsten alone, but by certain alterations in the equipment of one or more of the gold-milling plants in operation, or to be erected in the region, high-grade scheelite concentrates could be recovered. Some such arrangements are under consideration by the companies or syndicates concerned, and any action taken will depend largely upon assay returns from samples already collected or being collected. Many occurrences within the small area intensively prospected are a favourable indication that there may be commercial deposits in the region, and accordingly further careful prospecting is recommended.

In addition to the deposits described above, several occurrences of tungsten ore are known in Nova Scotia, New Brunswick, Manitoba and British Columbia. From Hardscrabble Creek, B.C., four tons of scheelite concentrates was shipped in 1939, this representing the first commercial shipment of tungsten concentrates in Canada for several years. Early in 1940 tungsten concentrates were shipped from a deposit at Goff, Halifax County, Nova Scotia, while a first shipment of 20 tons of complex tungsten concentrates from Outpost Island, Slave Lake, was exported to the United States for refining in 1941.

## DERMATITIS

A cautionary notice (Factory Form 367), just issued by H.M. Stationery Office (1d.; obtainable through any bookseller), concerns dermatitis and is of a size (18 in. by 12 in.) suitable for posting on factory or workshop walls. The notice contains a list of various substances, including chemicals, through contact with which, or by careless use of which, the disease may be contracted. It also incorporates valuable hints on prevention and cure.

# Parliamentary Topics

## Tax Relief to Metal Miners

IN the House of Commons on Tuesday, Mr. Spens asked the Chancellor of the Exchequer whether he was prepared to extend the provisions of section 31 of the Finance Act, 1941, relating to the production of metals that were of exceptional importance for the prosecution of the war, so as to give relief from Excess Profits Tax to those metal mining concerns which, in order to accelerate output, had departed from normal mining practice by concentrating on the production of high-grade ores, and, therefore, would incur increased costs in the post-war period. Sir Kingsley Wood, in a written reply, said that after consideration he had come to the conclusion that a case had been established for extending section 31 to give relief in the circumstances mentioned where departure from normal mining practice was of such a character as to reduce current costs and increase post-war costs. The relief contemplated would ordinarily proceed in principle on the basis of allowing the higher costs that would have been incurred if the increase in output had been obtained by normal mining methods. It would be measured by reference to the increase in the metal yield of the ore produced, the expenses allowable being increased in that proportion. He proposed to include a provision in next year's Finance Bill giving this relief for all accounting periods subject to the 100 per cent. E.P.T.

# Iodine Process for Copper

## Experiments Conducted in Chile

A CHILEAN company, the Compañia Joduradora de Cobre, has been formed to exploit the "iodine process" for the production of copper (U.S.P. 2,243,217 of 1941), but experiments conducted at a pilot plant in Santiago have not yet yielded conclusive results, especially as regards costs. The process is believed to be similar to one tried unsuccessfully some years ago by the Anaconda Copper Company. Local Press reports, transmitted by the U.S. Bureau of Mines, describe the process as occupying the following four stages.

(1) The ore is ground to ¼ in. mesh and dissolved in vats by means of sulphuric acid (obtained as a by-product in stage 2 of the process), which converts it into a copper sulphate solution.

(2) In the presence of iodine and sulphur trioxide, as well as of the hydrogen and oxygen in the water, the following reactions are produced: (*a*) the iodine is converted into hydriodic acid; (*b*) the sulphur trioxide is converted into sulphuric acid; and (*c*) the copper sulphate into insoluble cuprous iodide.

(3) The cuprous iodide is drawn off washed and dried, and converted, in a low-temperature furnace, to copper oxide of 80 per cent. purity plus iodine sublimate, which returns to stage 2 to precipitate new quantities of copper sulphate from the ore.

(4) The copper oxide is reduced in a smelting furnace and transformed into metallic copper of 99.98 per cent. purity, which, like electrolytic copper of the same grade, is of high market value and is suitable for a wide range of materials.

In the precipitation of one ton of this high-grade metallic copper, two tons of iodine are used, but almost all this is recovered in stage 3, the loss amounting to only ½ kg., while 600 kg. of sulphur are transformed into 1500 kg. of sulphuric acid monohydrate. It is stated that metallic copper can be obtained by this process at low cost, but the semi-official Fomento Corporation, which is interested in the company, announces that this question has not been definitely settled. Although experiments on a small scale are reported to be satisfactory, the Corporation doubts whether the same results can be obtained on a commercial scale.

# New Metal Standards

## Phosphor Bronze Ingots and Castings

FOUR specifications, B.S. 1058-1061/1942, have just been issued by the British Standards Institution, providing for two qualities of phosphor bronze ingots and castings. These form part of a series of specifications for various non-ferrous castings which is being drawn up as a result of a request from the Directorate of Economy of the Ministry of Supply for economy in the tin used for cast-copper alloys.

One of the qualities of phosphor bronze, that covered by B.S. 1058-9, corresponds to the phosphor bronze covered by B.S. Aircraft Specification 2B8. The use of this quality is restricted to essential purposes such as aircraft work.

The other quality, that covered by B.S. 1060-1, provides for a leaded phosphor bronze with a tin content lower than that specified in B.S. 1058-9. Phosphor bronzes in the past have been supplied for general engineering and maintenance work as sand castings or as chill cast stick using alloys of high tin content such as that covered by B.S. 1058-9. In many cases, such a high tin content is unnecessary, and wherever possible material conforming to B.S. 1060-1 should be used. It is recommended that as far as practicable scrap metal should be employed in the manufacture of leaded phosphor bronze, leaving virgin metal for use in high tin content specifications.

Copies of these specifications may be obtained from the Institution, 28 Victoria Street, S.W.1, price 2s. 3d. each, post free.

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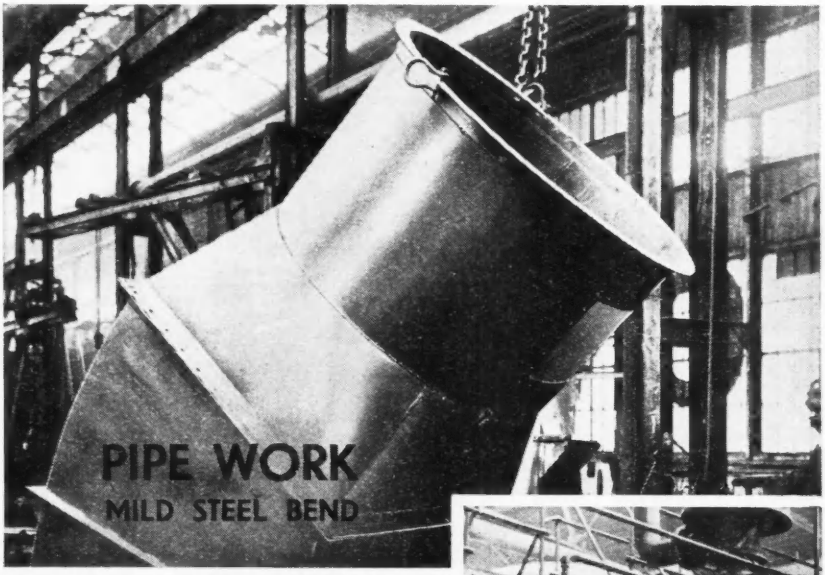


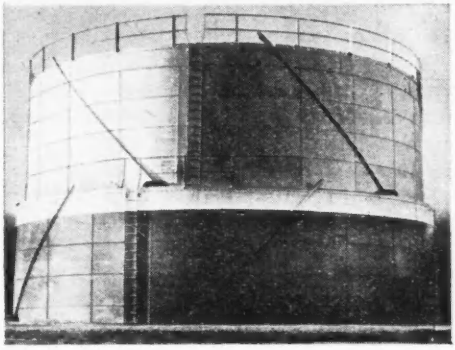

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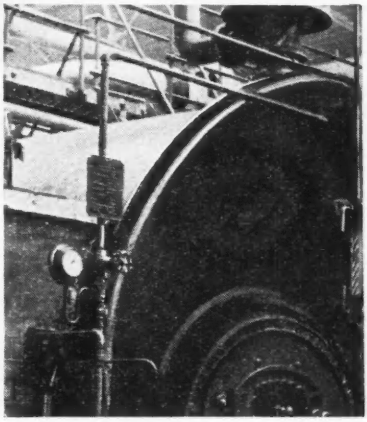

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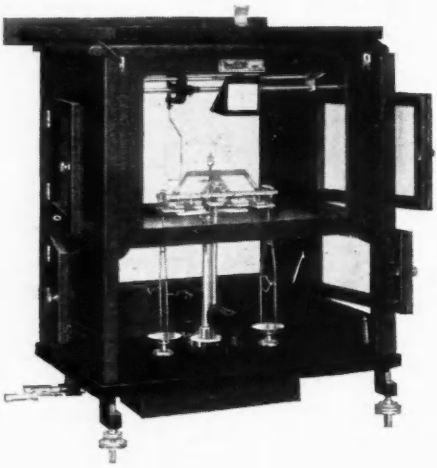

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# General News——From Week to Week

**At the recent annual meeting** of the Intitute of Metals, the election of 41 members and students for 1943-44 was announced.

**In addition to** the large number of increases in oil prices (recorded on a later page of this issue), the Minister of Food has increased the price of most grades of home-melt technical tallows and greases by 6s. per cwt., naked ex factory. The Order enacting the change came into force on September 28.

**The evening course** in chemical engineering at Battersea Polytechnic, which was suspended at the outbreak of war, is to be restarted, though in a modified form. It will again be under the direction of Mr. W. C. Peck, M.I.Chem.E. Particulars may be obtained from the Secretary, Battersea Polytechnic, London, S.W.11.

**In the recent R.A.F. raids** on Germany, in which Düsseldorf and Karlsruhe were attacked with four-ton bombs, industrial targets either demolished or severely damaged included a paint and dye factory; a chemical factory in the Volmerswerther Strasse, Karlsruhe; and the Carl E. Braunwerke factory, where insulating materials are made.

**The amount of zinc** used in the manufacture of galvanised iron and steel wire is to be reduced. The Ministry of Supply announces that, as from September 24, raw materials licences for zinc will not be granted, except in certain cases, for the production of galvanised wire. Existing orders can be completed, provided that delivery is made before November 1.

**During the four months** since the formation of the Anglo-Soviet Scientific Committee, contact between scientists of the two countries has been developed. A survey of Russian scientific and technical writings has been started by the committee, and glossaries of Russian scientific and technical terms are being collected, which will later form the basis of a technical dictionary. The University of London School of Slavonic Studies is to hold classes in Russian for scientific workers.

## Foreign News

**The output of iron and steel** in Brazil in 1941 has been officially recorded as follows:—pig-iron, 208,795 metric tons (against 185,300 in 1940); laminated iron, 149,928 tons (135,300); steel, 154,189 tons (141,000).

**A mine property** near Saint Antoine, Quebec, originally prospected for gold, may be an important source of molybdenum. Assays of a mineralised break 40 to 50 feet wide show more than 1.25 per cent. molybdenum. The property is within easy reach of shipping facilities.

**Good showings of beryl ore** are reported from properties in south-east Manitoba, and development work is being extended.

**Experiments with groundnut oil** as locomotive fuel are being carried out on three trains in service on the first portion of the Mediterranean-Niger Railway which was opened some time ago in French North Africa.

**Pure magnesia** is now being produced for the first time at Wakefield, Quebec. Production is in "substantial tonnage," it is stated. The material is used chiefly for high-temperature bricks and hydrated lime.

**A deposit of muscovite** was recently found in south-east Ontario, but the full extent of the deposit is not yet determined. Mica valued at £2500 has already been removed, and reserves with an estimated value of £10,000 are in sight.

**Imports of chemicals** into Argentina in the five months, January-May, 1942, amounted to 82,958 metric tons, an improvement on the corresponding figure of 65,286 tons for 1941. Though not up to the 1940 figure of 115,257 tons, the amount is now almost level with the total for January-May, 1939, which was 83,841 metric tons.

**A mixture called** "Alcoholina," consisting of 80 per cent. alcohol produced from grape residues with 15 per cent. benzene and 5 per cent. benzol, is being used with good results on the motor-bus service between Santiago and Valparaiso, Chile, a distance of 150 km. As the output of grape sugar in Chile is very large, and the grape residues have hardly been used at all up to now, it is hoped to produce large quantities of this fuel mixture.

**Work has started** on the site of the newly-planned steel works of the South African Iron and Steel Corporation, near Vereeniging, Transvaal. Structural machinery is being largely fabricated in South Africa, but the main electrical equipment and the majority of the cranes will be supplied from England, while the complete plate mill has been ordered from the U.S. At the same time, considerable extensions are going on at the Iscor steel plant at Pretoria.

**In order to overcome** difficulties arising from the shortage of imported raw materials, Sweden is developing local alternatives. Glycerol is being produced in a cellulose plant in Norrland from ethylene glycol. Pine oil used for the flotation of copper concentrates has been replaced by a product called "pinol" which is prepared from turpentine sulphate. Pine oil of Swedish origin is also being used instead of oleum for the treatment of apatite in the manufacture of phosphatic fertilisers, since imported rock phosphates are no longer available.

**Plans for a new quota** system for steel products in the U.S.A. are likely to come into force shortly, according to *Iron Age*. Under these, a master scheduling board will strive to "channel" steel products to war plants. Warrants linking actual needs with actual capacity are contemplated, and if adopted will replace the priorities system for steel.

**The quantity of copper** allowed to sulphate producers for vine growing in France for the 1942 season is 10,000 tons, compared with 15,000 tons last year. Receipt of 4000 tons in January, the same amount in February, and 2000 tons in March, is attributed to the sorting offices of metal mobilisation. As non-ferrous metals except aluminium, were imported by France prior to the war, the lack of these metals is now deeply felt.

**The growing output** in Brazil of national industries engaged in producing synthetic fibres, dyes, soap, and paper has created a larger demand for caustic soda, increased supplies of which are now difficult to obtain. The Federal Council of Foreign Trade recently approved a resolution authorising the National Salt Institute to study the matter of establishing a national caustic soda industry in Brazil.

**Brazil's wood pulp** imports in 1941 totalled 80,000 tons, compared with 64,000 tons in 1940. Owing to the difficulties of obtaining foreign supplies in war-time, a national wood pulp factory is being set up in the State of Parana, where there are abundant supplies of pinewood. It is expected that this factory will eventually furnish the bulk of the wood pulp required for manufacturing national newsprint.

**The lead mines** near Laisvall, Sweden, which are being opened up by the Boliden company, are nearly ready to start operations. The concentrator now under construction will begin work about the middle of 1943. Work on the smelter, which is being built at Rönnskär, is also making satisfactory progress. With a capacity of 15,000 tons per annum, the mining and smelting plant will cover about three-quarters of Sweden's normal requirements.

**The latest example** of the substitution of forest products and derivatives for imported materials, which is increasing daily in Sweden, is the introduction of a new flooring material, called "Forbolin." After having been shut down for some time owing to lack of linseed oil, the big Swedish factory of Forshaga Linoleum A/B was recently able to demonstrate this new flooring material. It is claimed to be equal, if not superior, to genuine linoleum in wearing and other qualities, the linseed oil binder having been replaced by a specially prepared chemical pulp in combination with oil derivatives from such pulp.

**A report has come** from Finland that a plant now under construction by the Outukumpu O/Y at Pori, which is the first of its kind in the country, will supply eventually 400 tons of nickel per annum. Meanwhile, the company is producing copper-nickel ore at the rate of 18,000 tons a year, most of which is probably being sent to German refineries.

**The importance of base metals** to the war effort is stressed by the plan announced by the Canadian advisory committee on manpower for the mining industry, which proposes to divert between 2600 and 2800 gold-miners to base-metal mines. An immediate transfer of 700 gold-miners to the Sudbury (Ontario) plant of the International Nickel Company has already been arranged.

**The Department of Mines** of Tasmania estimates that the newly discovered deposits of bauxite near Ouse contain approximately 2,000,000 tons. The silica content is low. Shaft sinking at Ouse is in progress to determine grade and tonnages. Other discoveries of bauxite have been made at Campbell Town and at St. Leonards near Launceston.

## Forthcoming Events

The London Section of the **Society of Chemical Industry** will open the session with a meeting in the Rooms of the Chemical Society, Burlington House, W.1, at 2.30 p.m., on **October 5,** when the chairman (Dr. A. J. V. Underwood) will deliver his address, entitled "Catalysts: Ancient and Modern."

A meeting of the **Electrodepositors' Technical Society** will take place at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3, on **October 6,** at 6 p.m., when the following paper will be presented: "Recent Developments in Metal Rectifiers as Applied to Electrodeposition," by Mr. D. Ashby, B.Sc., A.M.I.E.E., A.M.I.Mech.E.

The **Chemical Society** (Leeds Area Section) will hold a meeting in the Chemistry Lecture Theatre, Leeds University, on **October 12,** at 6.30 p.m., to hear Dr. F. Fairbrother speak on "Radioactive Isotopic Indicators."

The opening meeting of the 1942-43 Session of the **Chemical Engineering Group** (Society of Chemical Industry) and the **Institution of Chemical Engineers** will be held jointly on **October 13, at** 2.30 p.m., in the rooms of the Geological Society, Burlington House, London, W.1, when a paper on "The Production of Radium" will be presented by E. F. Mactaggart, B.Sc., A.R.C.S., A.M.I. Chem.E.

The opening meeting this session of the **Institute of Fuel** will be held on **October 13,** at 2.30 p.m., in the Lecture Theatre of the Institution of Electrical Engineers, Victoria Embankment, London, W.C.2, when the

president, Mr. W. M. Selvey, will present a short address. The Melchett Lecture, entitled "The Analysis and Testing of Coal in Relation to its Properties and Utilisation," will be delivered in the form of a talking film.

A meeting of the Birmingham and Midlands Section of the **Institute of Chemistry** will be held at the Chamber of Commerce, Birmingham, on **October 16**, at 5.30 p.m. Dr. R. J. L. Allen will discuss "Dried Foods with Special Reference to Vegetables."

## ADVANCED CHEMISTRY COURSES

Courses in advanced chemistry, including chemical engineering, prepared by the Yorkshire County Advisory Committee for advanced chemistry, have been arranged for the 1942-3 session at Leeds, Bradford and Huddersfield. Owing to emergency demands that may be made either on lecturers or on the colleges concerned, the courses are subject to cancellation at any time.

At Bradford Technical College the courses will start on Monday, October 5, and Wednesday, October 7. At Huddersfield the courses will be held at the Technical College on Thursdays (course already started) and on Fridays, starting October 16. Leeds College of Technology has two main courses, one on Fridays, starting October 2, and one on Thursdays, starting October 29, also a short eight-weeks' course beginning on Thursday, January 21, 1943.

# Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

### Company Winding-up Voluntarily

PECKHAM CHEMICAL CO., LTD. (C.W.U.V., 6/10/42). By special resolution, September 14. Mrs. May O'Donnell, 29 Elms Road, London, S.W.4, appointed liquidator.

# Company News

**Oxley Engineering Co., Ltd.**, announce a dividend, for the year ended June 30, of 12½ per cent. (same).

**Thorncliffe Coal Distillation, Ltd.**, report net profit, for the year to June 30, of £18,695 (£35,963). Final dividend 25 per cent., making 50 per cent. (same).

**British Emulsifiers, Ltd.**, is proposing to acquire the business of Aerlee (Aluminium), Ltd., which manufactures secondary aluminium alloys, of which the former company are substantial users. Mr. G. S. James is chairman and managing director of both companies.

**The Anglo-Iranian Oil Co., Ltd.**, announces a trading profit for 1941 of £6,023,347 (£5,747,440). An ordinary dividend of 7½ per cent. (5 per cent.) is being paid.

**Barluze (Products), Ltd.**, chemists, etc., of 5a Princes Way, Team Valley Trading Estate, Gateshead-on-Tyne, has increased its nominal capital by the addition of £2500, in £1 ordinary shares, beyond the registered capital of £5000.

**The National Fire Protection Co., Ltd.**, announce a balance of profit, for the year ended March 31, of £18,646 (£16,913). Net profit, £778, making £1876 added to £1098 balance brought in. Ordinary dividend 5 per cent. (same); no deferred dividend (same). Forward, £1404.

# New Companies Registered

**Carbonit, Ltd.** (376,223).—Private company. Capital: £100 in 100 shares of £1 each. Metal merchants, treaters and hardeners, manufacturers of and dealers in metal goods, mechanical, electrical, and general engineers, manufacturing chemists, etc. Directors: E. G. Seeley, F. R. James. Registered office: 239 High Street, Hounslow, Middlesex.

# Chemical and Allied Stocks and Shares

AN improvement in the volume of Stock Exchange business in the early part of the week has been reflected by an upward trend in security values. British Funds were higher under the lead of 3½ per cent. War Loan, and among industrial shares there were a number of strong features, although in most directions gains on balance were moderate in character but rather more widely spread than in recent weeks.

Imperial Chemical were 33s. 9d. compared with 33s. 6d. a week ago, and the 7 per cent. preference units 33s. 6d., while B. Laporte held their recent rise, business being recorded at 69s. Borax Consolidated deferred units were more active at the slightly higher level of 33s. 9d. the market being hopeful that the dividend may remain on a 7½ per cent. basis, while elsewhere, Imperial Smelting improved from 11s. 7½d. to 12s. 4½d. Lever & Unilever showed a further rally, being 30s. 1½d. compared with 29s. a week ago, awaiting the full results and annual statement. On the other hand, Triplex Glass 10s. units remained under the influence of the reduced profits for the past financial year, and were around 29s. 9d. Murex made the higher price of 97s. 6d., and Turner & Newall were better at 70s. Rayon shares have remained active. Although below the best price made following publication of the annual statement, Courtaulds at 41s. 1½d. were again higher

on balance for the week. British Celanese issues moved higher on the belief that a scheme is impending to deal with arrears of preference dividend, thus paving the way for a distribution on the ordinary shares. Bradford Dyers ordinary and preference were also better, there being hopes that the forthcoming results may announce a further payment in respect of preference dividend arrears. British Plaster Board were active around 25s. 9d. On the other hand, Associated Cement eased to 51s. 10½d. despite the maintenance of the interim dividend. Among iron, steel and kindred issues, Staveley were higher at 47s. 6d. under the influence of the recently-issued results and the maintenance of the dividend. Stewarts & Lloyds were 48s. 10½d. Tube Investments 87s. 9d., and United Steel 23s. 6d., while Babcock & Wilcox remained at 46s. Elsewhere, Bennis Combustion 5s. shares were quoted at 8s. 9d. As recently announced, the dividend of the last-named company is maintained at 10 per cent., the rate which has ruled for some years past.

Firmness was shown in Boots Drug at 37s. 3d. while the quotation for British Drug Houses improved from 18s. 9d. to 20s. Monsanto Chemicals 5½ per cent. preference shares have transferred at 23s. 3d., and Johnson Matthey 5 per cent. preference at 21s. 9d. There was rather less activity in shares of companies identified with plastics; British Industrial Plastics 2s. ordinary were 4s. 6d., Lacrinoid Products 4s. 4½d., and Erinoid 10s. 3d., the disposition being to await the financial results of the last-named company. At 79s. 6d. the units of the Distillers Co. were firm and slightly higher on balance, as were United Molasses at 29s. 9d. British Glues 4s. shares remained firm at 6s. 6d. and business in the participating preference was recorded at 30s.

In other directions, United Glass Bottle were 55s., and Forster's Glass 10s. ordinary have transferred at 25s. At 29s. Wall Paper Manufacturers deferred units more than held their recent improvement, the market being hopeful that the forthcoming results may show a better trend in profits, although no increase in dividend is generally expected at this stage. In other directions, Nairn & Greenwich were higher at 55s., as were Barry & Staines at 36s. 6d., while British Match remained firm at 36s. 9d. General Refractories were slightly better at 12s. 6d. In accordance with the general tendency, British Aluminium improved from 45s. to 45s. 9d., and British Oxygen from 67s. 9d. to 68s. 6d. Fison Packard were again 38s. 10½d., and Cooper McDougall 25s. Burt Boulton have changed hands around 14s. 6d. and elsewhere, British Emulsifiers 2s. ordinary shares were active at one time around 2s. 6d. Anglo-Iranian, "Shell" and other oil shares were less active, and movements in prices were moderate on balance.

# British Chemical Prices

## Market Reports

STEADY price conditions have been maintained in the industrial chemicals market during the past week. While an active interest is displayed generally, movements are mostly confined to materials which are already covered by contracts. The position of most of the soda products remains unaltered, with hyposulphite of soda and prussiate of soda steady. The demand for formaldehyde continues on a good scale and there is a steady call for acetone. Among the acids acetic is in steady request, and available supplies of citric and tartaric acids are below requirements. Trade in the coal-tar products section remains moderately active, there being no special features to record.

MANCHESTER.—The alkalis and other heavy chemical products are mostly meeting with a steady contract demand on the Manchester market and some new inquiry has been dealt with during the past week, principally on home trade account. So far as values are concerned these are on a steady to firm basis throughout the market, though little actual fresh change of any consequence has occurred. In most descriptions of both the light and heavy tar products ready outlets are being found and with one or two exceptions a steady flow of replacement business is being placed.

GLASGOW.—In the Scottish heavy chemical trade here is no change during the past week, home business maintaining its steady day to day transactions, while export trade is rather restricted. Prices remain very firm.

## Latest Oil Prices

LONDON.—September 30.—For the period ending October 31, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £46 10s. RAPESEED OIL, crude, £48 5s. COTTONSEED OIL, crude, £39 12s. 6d.; washed £42 15s.; refined edible, £48; refined deodorised, £49. COCONUT OIL, crude, £36 12s. 6d.; refined deodorised, £40. PALM KERNEL OIL, crude, £36; refined deodorised, £40; refined hardened deodorised, £44. PALM OIL, refined deodorised, £46; refined hardened deodorised, £49. GROUNDNUT OIL, crude, £44; neutralised and bleached, £48; refined hardened deodorised, £53 to £54. WHALE OIL, crude, hardened, 42 deg., £39.; refined hardened, 42 deg., £42. ACID OILS—Groundnut, £27 10s.; soya, £25 10s.; coconut and palm kernel, £31. ROSIN, 26s. 6d. to 33s. per cwt., ex wharf, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

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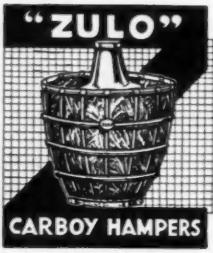


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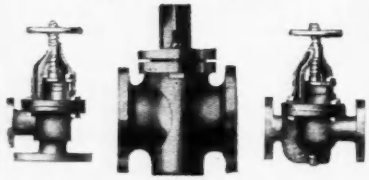

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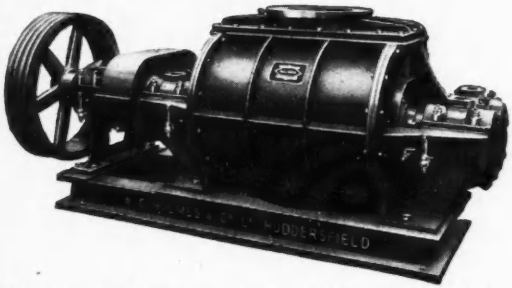

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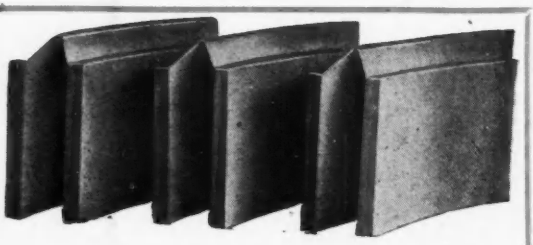

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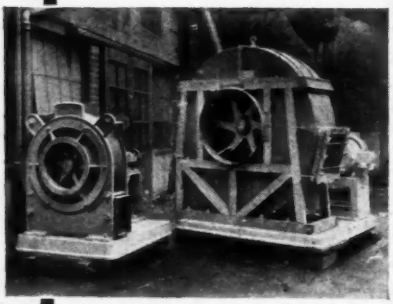

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